WHAT IS CLAIMED IS:

1. A method of applying energy to a hollow anatomical structure from within the hollow portion of the structure, the method comprising the steps of:

introducing a catheter having a working end with an energy application device at the working end into the hollow anatomical structure;

positioning the working end of the catheter proximate a treatment site within the hollow anatomical structure;

injecting a tumescent fluid solution into selected tissue that is in contact with the treatment site to cause the tissue to become tumescent and compress the hollow anatomical structure at the treatment site to a compressed size; and

applying energy to the compressed hollow anatomical structure at the treatment site via the energy application device until the hollow anatomical structure durably assumes a smaller size.

2. The method of claim 1 wherein the step of injecting a tumescent fluid solution comprises the step of injection enough tumescent fluid solution into the tissue such that the tumescent tissue compresses the treatment site sufficiently to exsanguinate blood from the hollow portion of the hollow anatomical structure at the treatment site.

3. The method of claim 1 wherein the step of applying energy comprises the step of applying energy to effectively occlude the treatment site.

4. The method of claim 3 further comprising the step of moving the energy application device along the treatment site while performing the step of applying energy so as to result in a lengthy occlusion of the treatment site.

5. The method of claim 1 wherein the step of moving the energy application device comprises moving the energy application device along the treatment site while performing the step of applying energy such that the hollow

anatomical structure collapses around the energy application device as it is being moved.

6. The method of claim 1 wherein the hollow anatomical structure comprises a vein and the treatment site comprises a length of the vein.

7. The method of claim 1 wherein the step of injecting a tumescent fluid solution into selected tissue comprises the step of injecting a tumescent fluid having an anesthetic into the selected tissue.

8. The method of claim 7 wherein the step of injecting a tumescent fluid solution into selected tissue comprises the step of injecting a tumescent fluid having an anesthetic and a vasoconstrictive drug into the selected tissue.

9. The method of claim 1 further comprising the step of delivering fluid from within the hollow structure to the treatment site.

10. The method of claim 9 wherein the step of delivering fluid comprises delivering fluid to exsanguinate the treatment site.

11. The method of claim 9 wherein the step of delivering fluid consists of delivering fluid from the following group:

saline;
vasoconstrictive agent;
sclerosing agent;
high impedance fluid; and
heparin.

12. The method of claim 1 further comprising the steps of:

sensing the temperatures at two separate locations on the energy application device;

averaging the two sensed temperatures at the two separate locations; and

determining a temperature at the energy application device based on the averaged temperatures.

13. The method of claim 1 wherein the step of applying energy to the compressed hollow anatomical structure at the treatment site comprises applying electrical energy to the inner wall of the treatment site with an electrode, the electrode being in apposition with the inner wall.

14. The method of claim 1 wherein the step of applying energy to the compressed hollow anatomical structure at the treatment site comprises applying electrical energy to the inner wall of the treatment site with an electrode, the electrode being in apposition with the inner wall, the method further comprising the steps of:

applying electrical energy with the electrode to effectively occlude the treatment site at the electrode; and

moving the electrode along the treatment site while maintaining the electrode in apposition with the vein wall while performing the step of applying energy to effectively occlude the treatment site so as to result in a lengthy effective occlusion of the treatment site.

15. The method of claim 14 wherein the step of applying energy comprises applying sufficient energy to collapse the hollow anatomical structure around the energy application device as it is being moved along the treatment site to result in a lengthy effective occlusion of the treatment site.

16. The method of claim 1 further comprising the step of determining when apposition of the energy application device with the inner wall of the hollow anatomical structure has occurred by monitoring the impedance experienced by the energy application device.

17. The method of claim 14 wherein the step of applying electrical energy to effectively occlude the treatment site at the electrode comprises applying said energy with a plurality of electrodes, and further comprises the steps of:

sensing the temperatures at two separate electrodes; and

averaging the two sensed temperatures; and

determining a temperature at the electrodes based on the averaged temperatures.

18. A method of applying energy to an inner wall of a vein from within the vein to occlude the vein along a treatment portion, the method comprising the steps of:

introducing a catheter having a working end with an energy application device at the working end into the treatment portion;

injecting a tumescent fluid solution into selected tissue outside the vein but in contact with the vein at the treatment site to cause the tissue to become tumescent and compress the vein at the treatment site to a compressed size;

applying energy to the compressed vein at the treatment site via the energy application device until the vein is occluded; and

withdrawing the catheter from the occluded while leaving the occluded vein in place.

19. The method of claim 18 wherein the step of injecting a tumescent fluid solution comprises the step of injecting enough tumescent fluid solution into the tissue such that the tumescent tissue compresses the treatment site sufficiently to exsanguinate blood from the hollow portion of the hollow anatomical structure at the treatment site.

20. The method of claim 18 further comprising the step of moving the energy application device along the treatment site while performing the step of applying energy so as to result in a lengthy occlusion of the treatment site.

21. The method of claim 18 wherein the step of moving the energy application device comprises moving the energy application device along the treatment site while performing the step of applying energy such that the vein collapses around the energy application device as it is being moved.

22. The method of claim 18 wherein the step of injecting a tumescent fluid solution into selected tissue comprises the step of injecting a tumescent fluid having an anesthetic into the selected tissue.

23. The method of claim 22 wherein the step of injecting a tumescent fluid solution into selected tissue comprises the step of injecting a tumescent fluid having an anesthetic and a vasoconstrictive drug into the selected tissue.

24. The method of claim 18 further comprising the step of delivering fluid to the treatment site.

25. The method of claim 24 wherein the step of delivering fluid comprises delivering fluid to exsanguinate the treatment site.

26. The method of claim 24 wherein the step of delivering fluid consists of delivering fluid from the following group:

saline;
vasoconstrictive agent;
sclerosing agent;
high impedance fluid; and
heparin.

27. The method of claim 18 further comprising the steps of:

sensing the temperatures at two separate locations on the energy application device; and

averaging the two sensed temperatures at the two separate locations;

determining a temperature at the energy application device based on the averaged temperatures.

28. The method of claim 18 wherein the step of applying energy to the compressed vein at the treatment site comprises applying electrical energy to the inner wall of the vein with an electrode, the electrode being in apposition with the inner wall.

29. The method of claim 18 wherein the step of applying energy to the compressed vein at the treatment site comprises applying electrical energy to the inner wall of the treatment site with an electrode, the electrode being in apposition with the inner wall, the method further comprising the steps of:

applying electrical energy with the electrode to effectively occlude the treatment site at the electrode; and

moving the electrode along the treatment site while maintaining the electrode in apposition with the vein wall while performing the step of applying energy to effectively occlude the treatment site so as to result in a lengthy effective occlusion of the treatment site.

30. The method of claim 29 wherein the step of applying energy comprises applying sufficient energy to collapse the vein around the electrode as it is being moved along the treatment site to result in a lengthy effective occlusion of the treatment site.

31. A method of applying energy to a hollow anatomical structure from within the hollow portion of the structure, the hollow anatomical structure having an inner wall, the method comprising the steps of:

introducing a catheter having a working end with an energy application device at the working end into the hollow anatomical structure;

positioning the working end of the catheter proximate a treatment site within the hollow anatomical structure;

determining when apposition of the energy application device with the inner wall of the hollow anatomical structure has occurred by monitoring the impedance experienced by the energy application device; and

applying energy to the compressed hollow anatomical structure at the treatment site via the energy application device until the hollow anatomical structure durably assumes a smaller size.

32. The method of claim 31 wherein the step of applying energy comprises the step of applying energy to effectively occlude the treatment site.

33. The method of claim 31 further comprising the step of moving the energy application device along the treatment site while performing the step of applying energy so as to result in a lengthy occlusion of the treatment site.

34. The method of claim 31 further comprising the step of injecting a tumescent fluid solution into selected tissue that is in contact with the treatment site to cause the tissue to become tumescent and compress the hollow anatomical structure at the treatment site to a compressed size.

35. The method of claim 31 wherein the step of injecting a tumescent fluid solution into selected tissue comprises the step of injecting a tumescent fluid having an anesthetic into the selected tissue.

36. The method of claim 35 wherein the step of injecting a tumescent fluid solution into selected tissue comprises the step of injecting a tumescent fluid having an anesthetic and a vasoconstrictive drug into the selected tissue.

37. The method of claim 31 further comprising the step of delivering fluid from within the hollow structure to the treatment site.

38. The method of claim 31 further comprising the steps of:

sensing the temperatures at two separate locations on the energy application device;

averaging the two sensed temperatures at the two separate locations; and

determining a temperature at the energy application device based on the averaged temperatures.

39. The method of claim 31 further comprising the steps of:

expanding a plurality of leads outwardly from the working end of the catheter, wherein the distal ends of the leads move away from each other and into non-penetrating contact with the inner wall of the anatomical structure; and

applying energy to the inner wall of the anatomical structure by the distal ends of the leads until the anatomical structure collapses.

40. A kit for treating varicose veins, comprising:

a catheter sized for insertion into a vein, the vein having an inner wall, the catheter having an energy application device that is expandable into apposition with the inner wall of the vein;

a medical tumescent fluid which when applied to tissue, causes tumescence of the tissue; and

a fluid delivery vessel capable of delivering a sufficient amount of the tumescent fluid into the tissue surrounding the vein to cause the tissue to reach a tumescent state and thereby compress the vein.

41. The kit of claim 40 wherein the fluid delivery vessel is capable of delivering a sufficient amount of the solution into the tissue surrounding the vein so as to cause the tissue to reach a tumescent state to exsanguinate the vein of blood.

42. The kit of claim 40 further comprising a flushing fluid consisting of the following group:

saline;
vasoconstrictive agent;
sclerosing agent;
high impedance fluid; and
heparin.

43. The kit of claim 40 wherein the tumescent fluid comprises an anesthetic.

44. The kit of claim 40 wherein the tumescent fluid comprises an anesthetic and a vasoconstrictive drug.

45. An apparatus for applying energy from a power source to a hollow anatomical structure, the power source being responsive to temperature signals to control the level of power, the apparatus comprising:

a catheter having a working end and a lumen configured for fluid delivery;

a plurality of expandable leads disposed at the working end, wherein the leads are formed and mounted to the catheter such that when in an unconfined configuration, the leads have sufficient strength to move themselves outward into non-penetrating apposition with the inner wall, and further, the leads are formed and mounted to the catheter such that they do not have sufficient strength to prevent the reduction of the diameter of the inner wall wherein as the inner wall reduces, the leads remain in non-penetrating apposition with the inner wall and move inward with it, the leads also having a distal portion with an uninsulated distal tip, each lead electrically connected to the power source; and

a plurality of temperature sensors located at the leads, the sensors providing temperature signals representative of the temperature sensed at the leads by each sensor;

wherein the expandable leads are configured so as to permit the catheter to be moved in the hollow anatomical structure at the same time that the leads are applying energy to the hollow anatomical structure.

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46. The apparatus of claim 45 further comprising means for averaging the temperature signals to provide an averaged temperature signal;

47. The apparatus of claim 45 wherein leads of the sensors are interconnected such that the temperature signals are averaged.

48. The apparatus of claim 45 wherein the expandable leads are staggered in a longitudinal direction.

49. The apparatus of claim 48 further comprising means for averaging the temperature signals.

50. The apparatus of claim 49 wherein leads of the sensors are interconnected such that the temperature signals are averaged.

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